

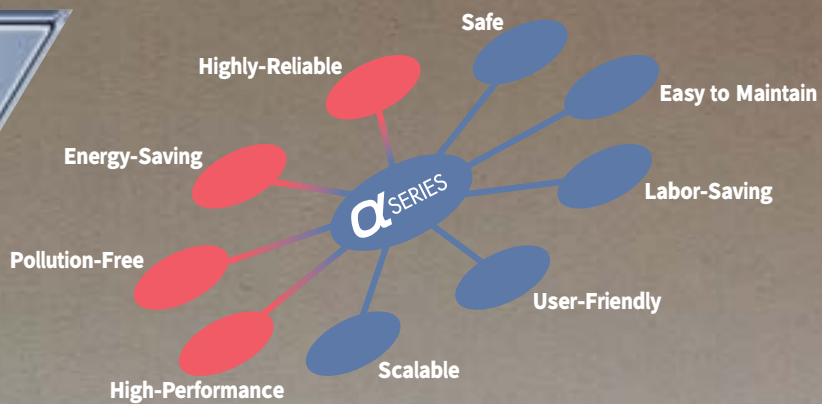
ETAC®

HIFLEX®



H I F L E X  S e r i e s
A l f a

Low Temperature & Humidity Chamber
High Temperature & Humidity Chamber
Low Temperature Chamber



A wide variety of functions required for the environmental test chamber is integrated effectively and efficiently.



Energy saving, environmentally friendly, and enhanced reliability... The new HIFLEX α series will meet the needs for the next generation chamber.

Since its first release in 1981, more than 10,000 units of HIFLEX were delivered to our customers, while responding to various needs as a "standard environmental test chamber". In 2004, it has evolved into "HIFLEX α series" with further enhanced functions and environmentally friendly features, on top of improved basic performance.

- Energy savings of up to 37% have been achieved (our comparison).
- The noise level has been reduced by up to 5dB (our comparison).
- An easier classification of part materials when dismantling (disposing).
- The HFC404A, a refrigerant with a zero ozone-depleting coefficient is used for the refrigerator.
- The usage amount of refrigerant has been reduced by half (our comparison).
- The frequency control system secures optimum refrigeration capacity at all times.
- The automatic refresh feature allows a long-term, stable supply of humidification water.

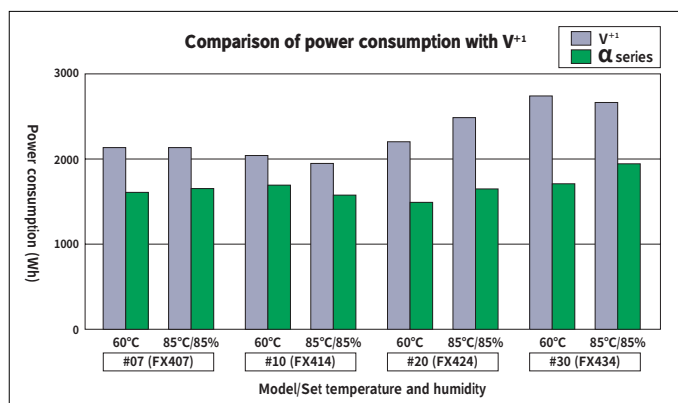


Producing environmentally friendly, reliable products is our

From the design stage, we have placed great importance on ISO14000 requirements and enhancement of product reliability, so that the HIFLEX **α** series will gain the confidence of our customers.

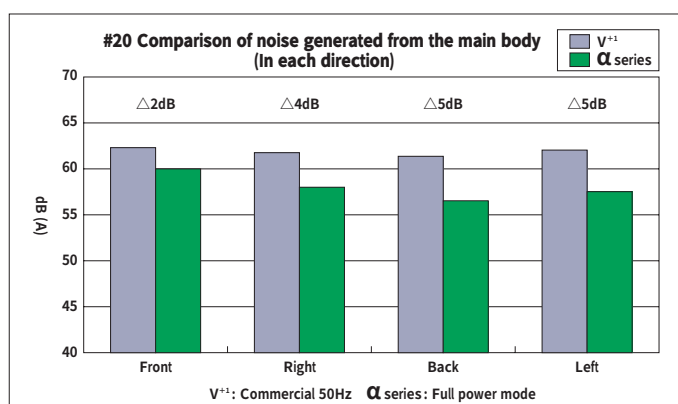
Energy-saving design

The power consumption was reduced by up to 37% (our comparison) by combining the inverter control system for the refrigerator and the refrigerant flow control with the electronic expansion valve. At the same time, the cooling capacity was enhanced and the temperature ramp-down rate was reduced (by 5 to 10 minutes).



Low noise design

The noise level was reduced by up to 5dB (our comparison) by removing noise from the condenser fan, by improving the shield quality of the machine room, and by adopting acoustic materials.



Efficient frame design for disposal

The multi-layered insulation panel design significantly relieves the burden of classification of materials when dismantling. Furthermore, plastic parts are made of environmentally friendly materials.

Further enhanced environmentally friendly features

The refrigerator and the circuit were completely renewed to minimize damage to the environment. In addition, we replaced the refrigerant with HFC404A, which has an ozone-depleting coefficient of "zero", and the consumption was reduced by half.



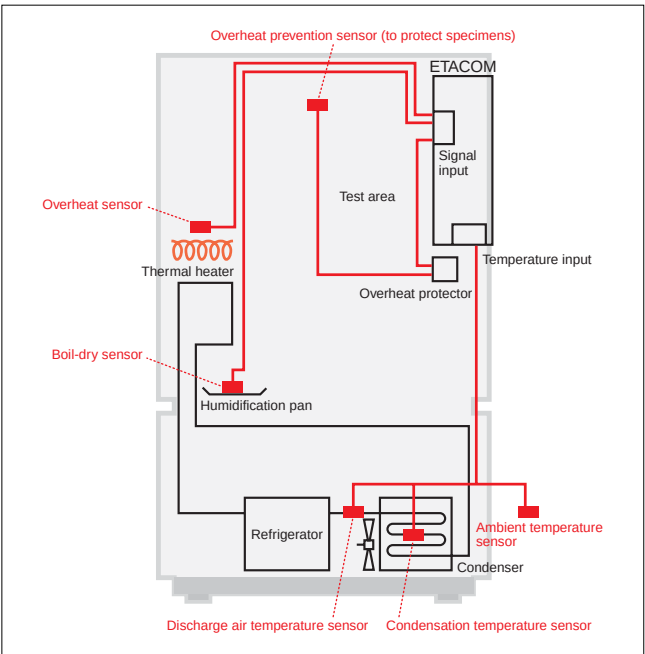
Enlarged temperature/humidity display

This allows operators to read operating conditions and the temperature/humidity display even from a distance or in a dim room without turning on the light. Thus, the LCD's weak points were eliminated.



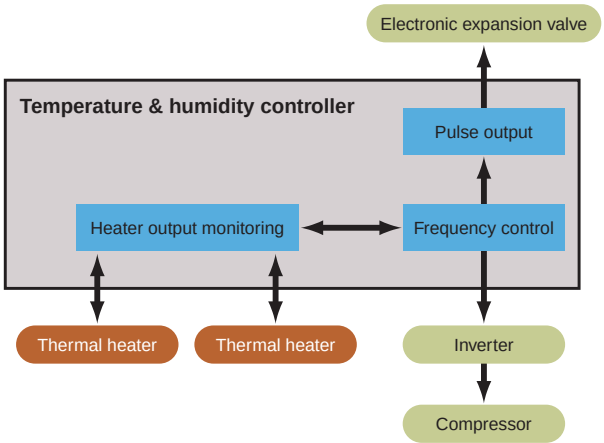
Equipped with a breakdown prevention sensor

In order to enhance the reliability of the results of multi-hour, continuous testing, the sensor which gathers preventive information against breakdowns was added as standard equipment. Based on this information, users will be able to inspect the specified area or replace parts before starting the test in order to prevent any possible breakdown.



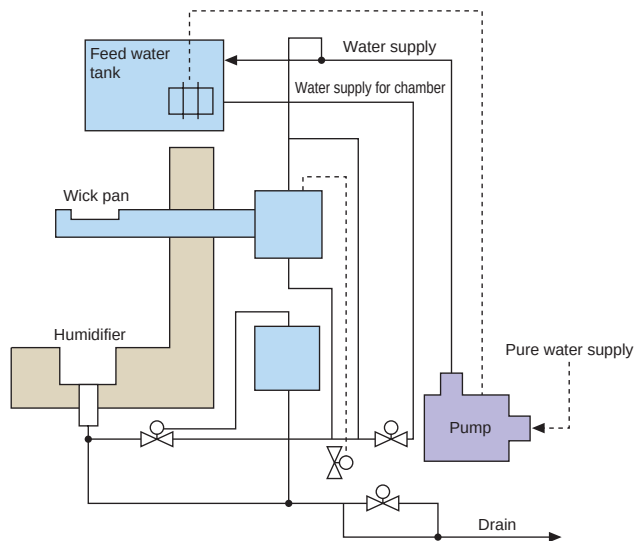
Frequency control system that keeps refrigeration capacity at most efficient level

It always monitors the cooling capacity, whether it is in excess or is deficient, based on heater output and other information. At the same time, it maintains optimum cooling capacity at all time in order to automatically control the operating frequency of the refrigerator and the electric expansion valve. The system is not affected by regional differences of power supply frequency.



Long-term, stable supply of humidification water

Durability of the water circuit, which usually deteriorates in a short period of time, has been greatly improved by adjusting the flow rate and strengthening the material. In addition, for continuous operation at medium temperature and humidity (+45°C/75%RH), more stable testing for longer hours was enabled by automatically refreshing water in the wick pan at a regular interval, which otherwise contaminates easily.

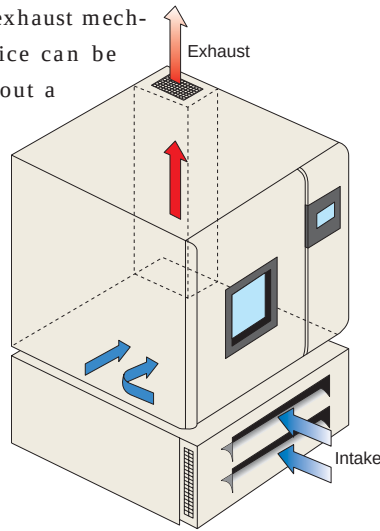


Highly practical, wide range of ETAC original technologies.

Not only to meet customers' needs, but also to enhance basic performance, ETAC has developed and adopted a number of new mechanisms.

Chamber-roof centralized air exhaust mechanism

The heat accumulated in the void under the main body and other locations is all channeled to be released through the roof by means of an air exhaust mechanism. Thus, the device can be placed by the wall without a gap, contributing to space-saving at installation sites.



Dustproof filter

The dustproof filter for the refrigerator condenser can be replaced at the front of the main body. Therefore, additional devices can be placed on either side of the chamber.



Square cable port that allows easy removal of cables

Convenient for applying current to specimens in the test area and for signal processing. Comes with special shielding material for flat cables.



Large viewing window with enhanced visibility

The effective area was expanded by 20% (our comparison). A fluorescent lamp is mounted in the test area, allowing better visibility of specimens.



Humidification collection mechanism at the back of the door

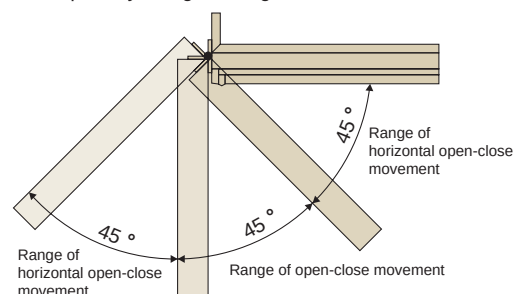
This allows condensation that accumulates at the back of the door during high temperature and high humidity testing to be collected and drained out. Thus, water droplets do not moisten the floor.



Door backswing stopper

This prevents the door from back-swinging, thus allowing the operator to use both hands while working with specimens. It also enhances operator's safety.

Illustration of specially-designed hinge



Wide varieties of products are available according to your needs.

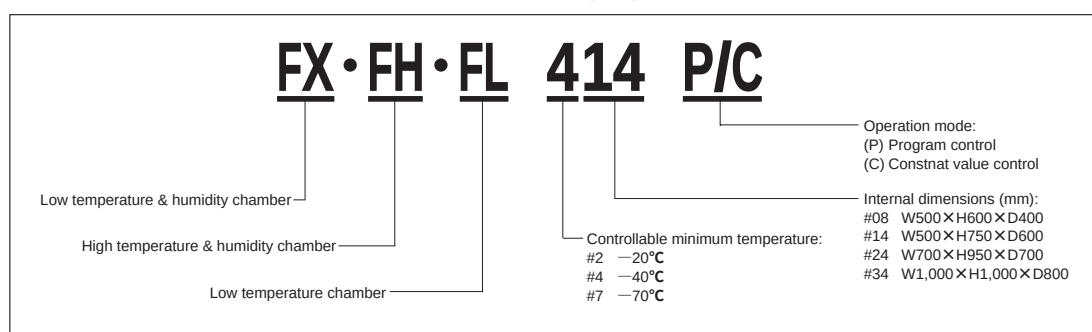
There are generally two controllers based on their controlling methods, namely the "constant controller" and the "program controller". Users can select the optimal model based on the controllable temperature/humidity range or on the internal dimensions of the chamber.

Quick reference for HIFLEX α series, model number, and basic performance

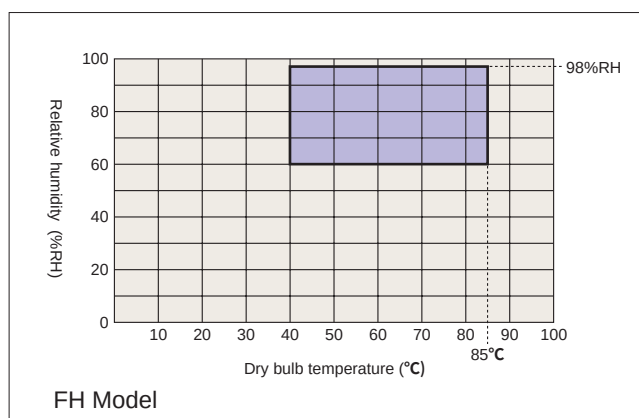
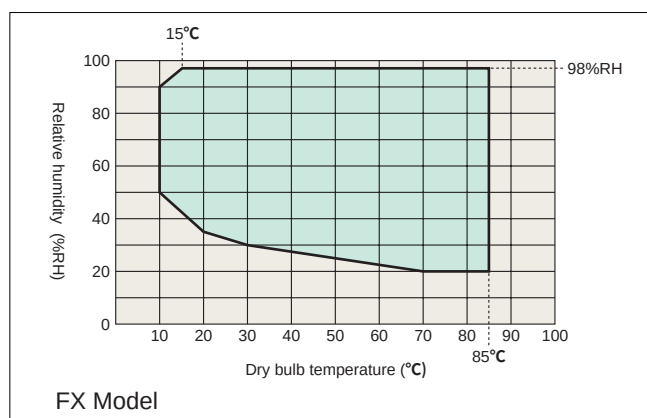
Low temperature & humidity chamber (Internal dimensions: mm)	W500×H600×D400	W500×H750×D600	W700×H950×D700	W1000×H1000×D800
-20°C~+100°C 20%RH~98%RH	FX208C	FX214C	FX224C	FX234C
	FX208P	FX214P	FX224P	FX234P
-40°C~+100°C 20%RH~98%RH	FX408C	FX414C	FX424C	FX434C
	FX408P	FX414P	FX424P	FX434P
-70°C~+100°C 20%RH~98%RH	—	FX714C	FX724C	FX734C
	—	FX714P	FX724P	FX734P
High temperature & humidity chamber (Internal dimensions: mm)	W500×H600×D400	W500×H750×D600	W700×H950×D700	W1000×H1000×D800
+10°C~+100°C 60%RH~98%RH	FH08C	FH14C	FH24C	—
	FH08P	FH14P	FH24P	—
Low temperature chamber (Internal dimensions: mm)	W500×H600×D400	W500×H750×D600	W700×H950×D700	W1000×H1000×D800
-20°C~+100°C	—	FL214C	FL224C	—
	—	FL214P	FL224P	—
-40°C~+100°C	FL408C	FL414C	FL424C	FL434C
	FL408P	FL414P	FL424P	FL434P
-70°C~+100°C	—	FL714C	FL724C	FL734C
	—	FL714P	FL724P	FL734P

*The +150°C maximum temperature option is available on all models.

HIFLEX α series model number coding system



Temperature and humidity controllable range



Temperature (humidity) controller with excellent operability,

Advanced user interface that allows a smooth and easy operation of various sophisticated functions.

Large, high luminance LED and touch panel liquid crystal screen

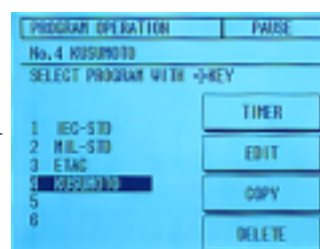
A large-size, high luminance LED was adopted for the temperature/humidity display, so that anyone can see the display from a distance even in a dark area. For the setting screen which requires a brighter and clearer display, a touch panel liquid crystal screen is used. These features are designed to meet various needs.

Sophisticated operation

The layered structure and user-friendly, interactive operation makes even the advanced program functions approachable for every user. Just by exploring the programs, the users will naturally learn how to use it.

Various display functions

With colorful graphic display functions, users can easily check the status of the program, operating conditions of each device, trouble-shooting methods, etc.



Program menu screen



Program setting screen



Operation screen (graph screen)

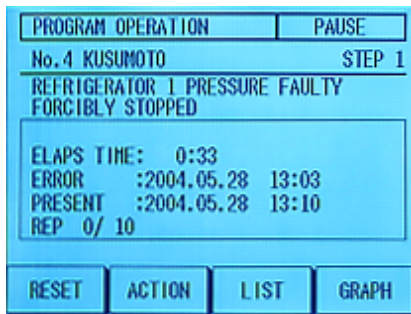


Operation screen (list screen)

Further enhanced self-diagnostic functions

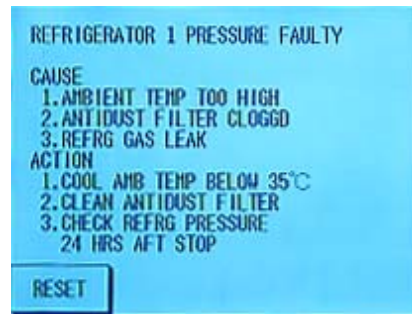
The sensor placed near the refrigerator monitors the operating conditions at all times. When an error occurs, the operating condition at the time is saved instantaneously and automatically, thus allowing a more accurate failure diagnosis and quick recovery. By adding 3CS (chamber central control system), maintenance procedures can be systemized.

Error screen



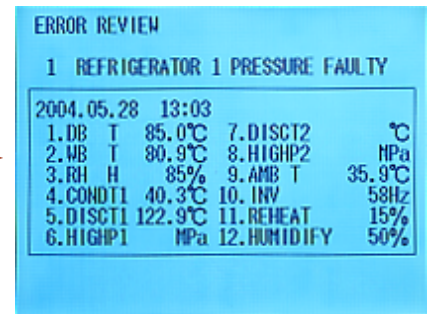
It displays type of error and the time occurred.

Trouble-shooting screen



It displays necessary check points and the corrective actions.

Error review screen



It displays the operating condition of the device when the error occurred.

Electromagnetic interference preventive measures for temperature (humidity) controller

ETAC's original controller "ETACOM-F65" has gone through static, burst, surge, and voltage dip tests in accordance with the IEC standard, and its anti-disturbance ability has been enhanced.



Noise test using the static tester

Basic functions

- Long-lasting (50,000 hours) liquid crystal screen
- Automatic power-saving function
- Automatic start/stop functions can be used during program operation
- Built-in calendar timer that indicates test end time (year, month, date, hour, minute)
- Larger No. of programs can be created (up to 30 programs, 50 steps per program)
- Program repeat function (up to 999 times, full or partial step repetition can be selected)
- Program name can be created using any alphanumeric characters of up to 12
- Skip function
- Wait function
- Hold function
- The preferred refrigerator can be selected for each step (according to the heat load)
- Upper and lower limits warning function (temperature and humidity)
- Operating condition monitoring function
- Error log saving function
- Trouble-shooting message function
- Time signal output (contact point capacity: 5A AC250V/2 channels)
- Interlock's contact point (contact point capacity: 10A AC220V)
- Test end output (contact point capacity: 5A AC250V)
- External alarm output (contact point capacity: 5A AC250V)
- Various communication functions (RS485, GP-IB, Ethernet - optional)

Dedicated controller for constant (constant value) operation

The simple, easy-to-use controller was specially designed for constant (constant value) operation.

Intuition-oriented key operation

It is designed to allow more intuition-oriented operation, as keys are symbolic for each function such as the "°C" or "%" keys are for setting temperature or humidity and the "TIME" key is for setting operating hours.

Additional standard functions

Automatic start/stop functions, which used to be optional, are included as standard functions.

Program operation is also available

By adding optional communication functions (RS485, GP-IB, Ethernet, etc.), program operation can be also performed.



Example of ambient temperature display



Refrigerator 1: Example of discharge pipe temperature display



Example of error display

Basic functions

- Automatic power-saving function
- Automatic start/stop functions
- Upper and lower limits warning function (temperature and humidity)
- Operating conditions monitoring function
- Interlock's contact point (contact point capacity: 10A AC220V)
- Various communication functions (RS485, GP-IB, Ethernet-optional)



SIR 12

Insulation degradation measurement system

Ion migration and insulation resistance can be measured simultaneously (2-way type), and it performs highly reliable testing by synchronizing the measurement with the operation of an environmental test chamber.

- The constant automatic measurement system allows accurate detection of the beginning and ending of ion migration.
- Voltage applied to specimens and measurement voltage can be set according to your needs, and high resistance (1×10^{13}) can be measured.
- The system is suited for insulation resistance evaluation of a built-up board or underfill agent.

Measurable current range	: 320 μ A~10pA
Voltage to be applied	: 250V, 500V, 1KV DC
Measurement cycle	: 40ms/8points
Measuring points	: 16ch/board (MAX.128ch)



MCL 41

Capacitor (temperature) characteristic evaluation system

The automatic measurement system integrates the measurement unit, environmental test chamber, measurement jigs, and software in order to allow the automatic and efficient temperature characteristic evaluation of condensers.

- Five items to be measured: Electrostatic capacity (C), dielectric dissipation factor $\tan \delta$ (D), impedance ($|Z|$), temperature ($^{\circ}\text{C}$), and elapsed time (minutes).
- The standard specification allows automatic measurement of 20 capacitors (It can be increased to 40 capacitors by adding units of 4.)

Test frequency:	20~1 MHz
Measurement specification:	
$ Z $ impedance	0.01 m~99.9999 M Ω
C capacity	0.01 f~9.99999 F
D dielectric dissipation factor	0.000001~9.999999
Temperature related setting:	
Temperature step	50 (MAX.)
Temperature range	-70 $^{\circ}\text{C}$ ~+180 $^{\circ}\text{C}$
Temperature stable range	0 to 99 min.

Guide to other relevant products

Electric field shielded low temperature & humidity chamber

HIFLEX SHIELD

It has both the shielding performance of 60dB/150KHz to 10GHz and accurate temperature/humidity control functions.

HIFLEX SHIELD is a brand new electric field shielded chamber that was developed by combining our temperature/humidity controlling technology which we have been cultivating for many years as a dedicated environment test chamber manufacturer, and our unique electric field shielding technology. It has the capacity of controlling a wide range of temperature/humidity, as well as electric field shielding of 60dB/150KHz to 10GHz. The device is best used for technical standard conformance testing of communication systems or devices, and temperature & humidity characteristic tests associated with communication frequencies or output electric fields.



Network compatible temperature (humidity) test chamber



KEYLESS Chamber

Network compatible Keyless Chamber

It is the industry's first keyless environmental test chamber with high performance equivalent to HIFLEX α series which realized space-saving, low price, and flexible system configuration. According to your needs, 2 or 3 units can be stacked up in the same space, thus further enhancing the advantage of the space-saving feature of the keyless chamber. An air-cooling refrigerator can be placed outdoors, and as a result, air conditioning expenses will be significantly reduced.

*Keyless: It is a chamber which eliminated operation keys from its main body, while using the PC as its controller.

*Flexible system configuration: It is a design which allows the measurement unit to be placed on its right or left side.

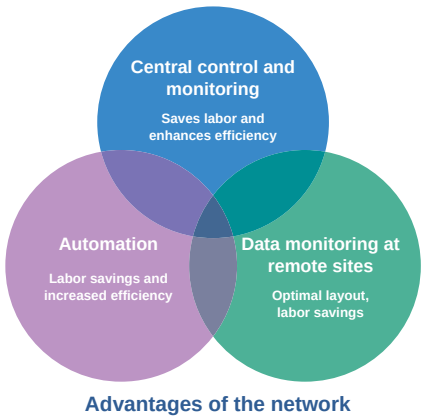
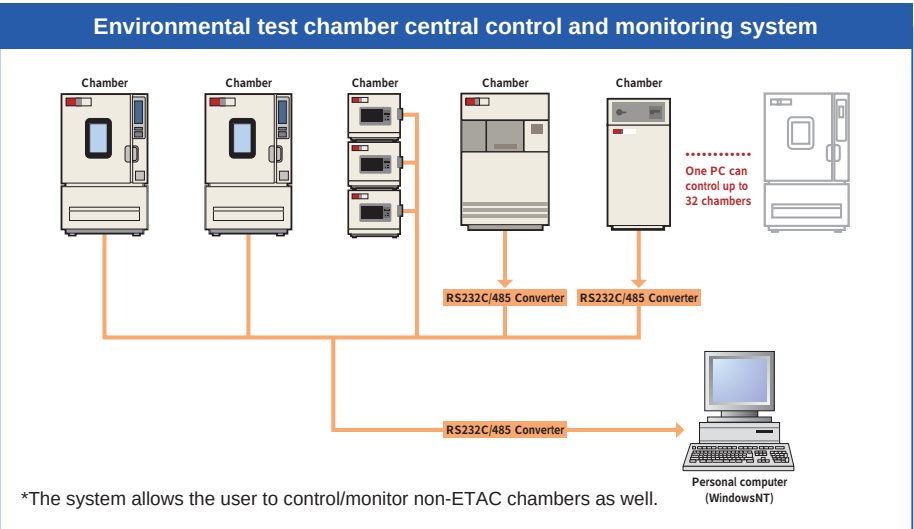


Reliability test network system



It achieves automation, labor-saving, and optimization of each location.

By establishing a network for reliability tests, solutions are given to businesses which are seeking the centralization of resources, fast responses to technological innovation, and enhancement of operational efficiency.





High temperature & humidity chamber

Model			FH08 (P/C)		FH14 (P/C)		FH24 (P/C)		
Performance	Temperature range		+10℃~+100℃ [+10℃~+150℃]						
	Humidity range		60%RH~98%RH (See "Controllable temperature and humidity range" on Page 6)						
	Temperature ramp-up rate		+10℃~+100℃ [+10℃~+150℃]						
			within 30 [45] minutes						
	Temperature and humidity uniformity		±0.5℃／±3.0%RH [±0.75℃ (+100.1℃~+150℃)]						
	Temperature and humidity fluctuation range		±0.3℃／±2.5%RH [±0.5℃ (+100.1℃~+150℃)]						
	Sensor		PT100Ω						
	Ambient temperature range		+5℃~+35℃						
Main body	Internal dimensions (W×H×Dmm)		500×600×400		500×750×600		700×950×700		
	Capacity (liter)		120		225		465		
	External dimensions (W×H×Dmm)		943×1663×770		943×1813×1115		1143×2013×1215		
	Weight (kg)		235		265		320		
	Exterior material		Bonded steel plate (Main body)/Stainless steel plate (Door)/Acryl baking finish						
	Interior material		Stainless steel plate (SUS304)						
Main unit	Circulating fan		Sirocco fan						
	Refrigerator		Air-cooled, hermetically sealed compressor						
	Refrigerant		HCFC22						
	Expansion device		Capillary tube						
	Thermal heater		Nichrome strip wire heater						
	Humidification heater		Sheathed heater						
	Cooling device		Plate fin coil						
	Temp. and humidity controller	Control method		PID control by microprocessor					
		Display		Large-size LED display					
		Display resolution		0.1℃/1.0%RH					
		Program features (P type)		Number of steps: 0 to 50 STEPs, Max. number of repetitions: 999 cycles, Number of registrable programs: 0 to 30					
Facilities need preparation by users		Power supply		200V AC, 3φ, 50/60Hz, Voltage fluctuation ±10%					
		Humidification water		Ion-exchange water or distilled water (10μS/cm or less)					
Max. current (A)			16				18		
Max. load current (A)			19				20		
Protection devices			Earth leakage breaker for power supply, Monitoring device for negative phase of primary power source, Overheat protector (double), Boil dry protector, Pressure switch for refrigerator, Overload relay for fan motor, Overload relay for refrigerator, Overload protection circuit breaker for thermal heater, Overload protection circuit breaker for humidification heater, Overload protection circuit breaker for control circuit						
Additional functions			Microcomputer self-diagnostic function, Automatic restart prevention function after power failure, Instantaneous power failure backup function, Power interlocking function to protect specimens, External alarm output terminal, Memory backup function, Upper and lower temperature/humidity limits warning function, Automatic start/stop functions, Operating condition monitoring function, Refrigerator manual operation function, Time signal output terminal (P), LCD backlight automatic turn-off function (P), Troubleshooting function (P), Error log automatic saving function (P), Test end output terminal (P), Calendar timer function (P), Wait function (P), Pause function (P), Room light automatic turn-off function						
Communication function			Compatible with RS485, GP-IB, or Ethernet (Optional)						
Standard feature		Body		Viewing window (W210×H303mm), Room light, Square cable port (W100×H30mm), Caster, Adjuster,					
		Accessories		Shelf: 2 pieces, User's manual, Wet-bulb wick gauze, Warranty card					

Note 1) "P type" and "C type" are "program control" and "constant value control" specifications respectively. Note 2) The conditions stated in [] are for 150°C specification models. Note 3) The "Performance" is guaranteed when the ambient temperature is +20°C±3°C and there are no specimens in the test area. Note 4) The external dimensions do not include projecting parts of the chamber. Note 5) "Max. current (A)" is the maximum current value which can be reached during a normal temperature and humidity test. Note 6) "Max. load current" is the maximum current which flows when every load is applied at the same time. *Please note that the specifications are subject to change for improvement/modification without any prior notice.

FX Low temperature & humidity chamber

Model			FX208 (P/C)	FX214 (P/C)	FX224 (P/C)	FX234 (P/C)		
Performance	Temperature range		-20°C~+100°C [-20°C~+150°C]					
	Humidity range							
	Temperature ramp-up rate		-20°C~+100°C [-20°C~+150°C]					
			within 45 [60] minutes		within 50 [70] minutes			
	Temperature ramp-down rate		+20°C~-10°C					
			within 25 minutes		within 30 minutes	within 35 minutes		
	Temperature and humidity uniformity		±0.5°C/±3.0%RH [±0.75°C (+100.1°C~+150°C)]			±0.75°C/±5.0%RH [±1.5°C(+100.1°C~+150°C)]		
	Temperature and humidity fluctuation range							
	Sensor							
	Ambient temperature range							
Main body	Internal dimensions (W×H×Dmm)		500×600×400	500×750×600	700×950×700	1000×1000×800		
	Capacity (liter)		120	225	465	800		
	External dimensions (W×H×Dmm)		943×1663×770	943×1813×1115	1143×2013×1215	1443×2073×1315		
	Weight (kg)		275	300	360	480		
	Exterior material							
	Interior material							
Main unit	Circulating fan							
	Refrigerator							
	Refrigerant							
	Expansion device							
	Thermal heater							
	Humidification heater							
	Cooling device							
	Temp. and humidity controller	Control method						
		Display						
		Display resolution						
Program features (P type)								
Facilities need preparation by users		Power supply						
		Humidification water						
Max. current (A)			20	22	23	37		
Max. load current (A)			24	26	27	42		
Protection devices			Earth leakage breaker for power supply, Monitoring device for negative phase of Overload relay for refrigerator, Overload protection circuit breaker for thermal heater,					
Additional functions			Microcomputer self-diagnostic function, Automatic restart prevention function after power failure, Upper and lower temperature/humidity limits warning function, Automatic start/stop functions, Troubleshooting function (P), Error log automatic saving function (P), Test end output terminal (P),					
Power saving function								
Communication function								
Standard feature		Body						
		Accessories						

Note 1) "P type" and "C type" are "program control" and "constant value control" specifications respectively. Note 2) The conditions stated in [] are for 150°C specification models. Note 3) The "Performance" is guaranteed when the ambient temperature is +20°C±3°C and there are no specimens in the test area. Note 4) The external dimensions do not include projecting parts of the chamber. Note 5) "Max. current (A)" is the maximum current value which can be reached during a normal temperature and humidity test. Note 6) "Max. load current" is the maximum current which flows when every load is applied at the same time. *Please note that the specifications are subject to change for improvement/modification without any prior notice.

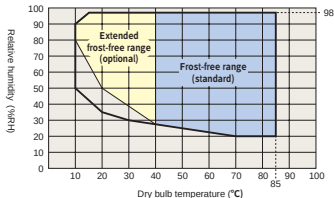
	FX408 (P/C)	FX414 (P/C)	FX424 (P/C)	FX434 (P/C)	FX714 (P/C)	FX724 (P/C)	FX734 (P/C)
	-40°C~+100°C [-40°C~+150°C]				-70°C~+100°C [-70°C~+150°C]		
20%RH~98%RH (See "Controllable temperature and humidity range" on Page 6)							
	-40°C~+100°C [-40°C~+150°C]				-70°C~+100°C [-70°C~+150°C]		
	within 45 [60] minutes			within 50 [70] minutes	within 70 [90] minutes		within 80 [100] minutes
	+20°C~-40°C				+20°C~-70°C		
	within 60 minutes		within 70 minutes	within 65 minutes	within 90 minutes		within 100 minutes
	±0.5°C/±3.0%RH [±0.75°C (+100.1°C~+150°C)]			±0.75°C/±5.0%RH [±1.5°C(+100.1°C~+150°C)]	±0.5°C/±3.0%RH [±0.75°C(+100.1°C~+150°C)]	±1.0°C/±5.0%RH [±1.5°C(+100.1°C~+150°C)]	±2.0°C/±5.0%RH [±3.0°C(+100.1°C~+150°C)]
	±0.3°C/±2.5%RH [±0.5°C (+100.1°C~+150°C)]					±0.5°C/±3.0%RH [±0.75°C(+100.1°C~+150°C)]	
PT100Ω							
+5°C~+35°C							
	500×600×400	500×750×600	700×950×700	1000×1000×800	500×750×600	700×950×700	1000×1000×800
	120	225	465	800	225	465	800
	943×1663×770	943×1813×1115	1143×2013×1215	1443×2073×1315	943×1923×1220	1143×2023×1320	1443×2073×1420
	275	300	360	545	485	595	670
Bonded steel plate (Main body) /Stainless steel plate (Door) /Acryl baking finish							
Stainless steel plate (SUS304)							
Sirocco fan							
Air-cooled, hermetically sealed compressor					Air-cooled, hermetically sealed compressor (Dual refrigeration system)		
HFC404A					HFC23 + HFC404A		
Pulse-control electronic expansion valve					Pulse-control electronic expansion valve, Thermal expansion valve + Constant pressure expansion valve		
Nichrome strip wire heater							
Sheathed heater							
Plate fin coil							
PID control by microprocessor							
Large-size LED display							
0.1°C/1%RH							
Number of steps: 0 to 50 STEPs, Max. number of repetitions: 999 cycles, Number of registrable programs: 0 to 30							
200V AC, 3φ, 50/60Hz, Voltage fluctuation ±10%							
Ion-exchange water or distilled water (10μ S/cm or less)							
	20	22	23	37	27	30	45
	24	26	27	50	39	42	58
primary power source, Overheat protector (double), Boil dry protector, Pressure switches for refrigerator, Overload relay for fan motor, Overload protection circuit breaker for humidification heater, Overload protection circuit breaker for control circuit							
Instantaneous power failure backup function, Power interlocking function to protect specimens, External alarm output terminal, Memory backup function, Operating condition monitoring function, Refrigerator manual operation function, Time signal output terminal (P), LCD backlight automatic turn-off function (P), Calendar timer function (P), Wait function (P), Pause function (P), Room light automatic turn-off function							
Power saving automatic switching feature (P), Manual setting function							
Compatible with RS485, GP-IB, or Ethernet (Optional)							
Viewing window (W210×H303mm), Room light, Square cable port (W100×H30mm), Caster, Adjuster,							
Shelf: 2 pieces, User's manual, Wet-bulb wick gauze, Warranty card							

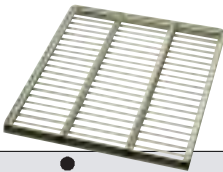
Model			FL214 (P/C)	FL224 (P/C)	FL408 (P/C)		
Performance	Temperature range		-20℃~+100℃ [-20℃~+150℃]				
	Temperature ramp-up rate		-20℃~+100℃ [-20℃~+150℃]		within 45 [60] minutes		
	Temperature ramp-down rate		+20℃~-10℃				
			within 25 minutes	within 30 minutes			within 60 minutes
	Temperature uniformity		±0.5℃ [±0.75℃ (+100.1℃~+150℃)]				
	Temperature fluctuation range						
	Sensor						
Ambient temperature range							
Main body	Internal dimensions (W×H×Dmm)		500×750×600	700×950×700	500×600×400		
	Capacity (liter)		225	465	120		
	External dimensions (W×H×Dmm)		943×1623×1115	1143×1823×1215	943×1623×770		
	Weight (kg)		290	350	265		
	Exterior material						
	Interior material						
Main unit	Circulating fan						
	Refrigerator						
	Refrigerant						
	Expansion device						
	Thermal heater						
	Cooling device						
	Temperature controller	Control method					
		Display resolution					
		Display					
Program features (P type)							
Facilities need preparation by users		Power supply					
Max. current (A)			14	16	13		
Max. load current (A)			18	20	17		
Protection devices			Earth leakage breaker for power supply, Monitoring device for negative Overload relay for refrigerator, Overload protection circuit breaker for				
Additional functions			Microcomputer self-diagnostic function, Automatic restart prevention function after function, Upper & lower temperature limits warning function, Automatic start/stop function (P), Troubleshooting function (P), Error log automatic saving function (P),				
Power saving function							
Communication function							
Standard feature		Body					
		Accessories					

Note 1) "P type" and "C type" are "program control" and "constant value control" specifications respectively. Note 2) The conditions stated in [] are for 150°C specification models. Note 3) The "Performance" is guaranteed when the ambient temperature is +20°C±3°C and there are no specimens in the test area. Note 4) The external dimensions do not include projecting parts of the chamber. Note 5) "Max. current (A)" is the maximum current value which can be reached during a normal temperature test. Note 6) "Max. load current" is the maximum current which flows when every load is applied at the same time. *Please note that the specifications are subject to change for improvement/modification without any prior notice.

	FL414 (P/C)	FL424 (P/C)	FL434 (P/C)	FL714 (P/C)	FL724 (P/C)	FL734 (P/C)
−40°C~+100°C [−40°C~+150°C]				−70°C~+100°C [−70°C~+150°C]		
−40°C~+100°C [−40°C~+150°C]				−70°C~+100°C [−70°C~+150°C]		
			within 50 [70] minutes	within 70 [90] minutes		within 80 [100] minutes
+20°C~−40°C				+20°C~−70°C		
	within 60 minutes	within 70 minutes	within 65 minutes	within 90 minutes		within 100 minutes
			±0.75°C [±1.5°C (+100.1°C~+150°C)]	±0.5°C [±0.75°C (+100.1°C~+150°C)]	±1.0°C [±1.5°C (+100.1°C~+150°C)]	±2.0°C [±3.0°C (+100.1°C~+150°C)]
±0.3°C [±0.5°C (+100.1°C~+150°C)]					±0.5°C [±0.75°C (+100.1°C~+150°C)]	
PT100Ω						
+5°C~+35°C						
	500×750×600	700×950×700	1000×1000×800	500×750×600	700×950×700	1000×1000×800
	225	465	800	225	465	800
	943×1623×1115	1143×1823×1215	1443×1883×1315	943×1883×1220	1143×1983×1320	1443×2033×1420
	290	350	535	475	585	660
Bonded steel plate (Main body) /Stainless steel plate (Door) /Acryl baking finish						
Stainless steel plate (SUS304)						
Sirocco fan						
Air-cooled, hermetically sealed compressor				Air-cooled, hermetically sealed compressor (Dual refrigeration system)		
HFC404A				HFC23 + HFC404A		
Pulse-control electronic expansion valve				Pulse-control electronic expansion valve, Thermal expansion valve + constant pressure expansion valve		
Nichrome strip wire heater						
Plate fin coil						
PID control by microprocessor						
Large-size LED display						
0.1°C						
Number of steps: 0 to 50 STEPs, Max. number of repetitions: 999 cycles, Number of registrable programs: 0 to 30						
200V AC, 3 φ, 50/60Hz, Voltage fluctuation ±10%						
	15	16	30	27	30	37
	18	20	35	31	34	43
phase of primary power source, Overheat protector (double), Pressure switches for refrigerator, Overload relay for fan motor, thermal heater, Overload protection circuit breaker for control circuit						
power failure, Instantaneous power failure backup function, Power interlocking function to protect specimens, External alarm output terminal, Memory backup functions, Operating condition monitoring function, Refrigerator manual operation function, Time signal output terminal (P), LCD backlight automatic turn-off Test end output terminal (P), Calendar timer function (P), Wait function (P), Pause function (P), Room light automatic turn-off function						
Power saving automatic switching feature (P), Manual setting function						
Compatible with RS485, GP-IB, or Ethernet (Optional)						
Viewing window (W210×H303mm), Room light, Square cable port (W100×H30mm), Caster, Adjuster,						
Shelf: 2 pieces, User's manual, Wet-bulb wick gauze, Warranty card						

Various optional features to enhance functionality.

150°C specification	Defroster	Delayed humidification feature	Additional overheat protector	
Maximum controllable temperature can be increased up to +150°C for all models. At the same time, it has sufficient capacity to cool down from 150°C to perform a wider range of environmental tests.	Automatically removes frost formed around the cooling coil during a low temperature/high humidity test.	This feature delays humidification at the beginning of the humidity/temperature test in order to prevent condensation on the specimens.	On top of the three overheat protectors which are included as standard equipment, an additional overheat protector can be purchased in order to better protect specimens. It protects the test area from overheating.	
FX ●	●	●	●	
FL ●	●		●	
FH ●	●	●	●	
Direct humidification water supply system	Glove ports	Over cooling protector	Water-cooling system	
If pure water is available at the installation site, the water pipe can be connected to the chamber's feed water tank directly to use it as humidification water.	A pair of glove ports with an inside diameter of 120mm can be created at the lower part of the door. With these ports, operators can handle specimens without disturbing the test environment.	In order to perform accurate tests and to protect specimens, it prevents the temperature from dropping excessively below the set temperature.	Suitable when using multiple units of chambers in one room or strict temperature control is required. It is recommended if the room temperature of the installation site exceeds +35°C.	
FX ●	●	●	●	
FL	●	●	●	
FH ●	●	●	●	
Hour meter with reset function	Different voltage specification	Power cables	Power plug	
This is the hour meter which allows a user to reset when necessary. It is useful for the time management of specimens, etc.	An optional feature for overseas users. Please inform us of your required voltage, current, frequency, and other conditions.	Four-wire cabtire cables in lengths of 3m, 5m, and 10m. Both ends have round terminals. *The chamber does not come with the power cable.	The four-wire plug is available.	
FX ●	●	●	●	
FL ●	●	●	●	
FH ●	●	●	●	
GP-IB Interface	RS485 interface		RS232C/RS485 converter	
Complies with the IEEE-488 standard. The connector can be fixed on the right side of the main body where output terminals are located.	Complies with the RS485 standard. Excellent for remote control or data management with the PC. Easily connected with a modular jack type connector.		It converts RS485 signals sent from the environmental test chamber to RS232C signal. One converter must be installed on the PC.	
FX ●	●		●	
FL ●	●		●	
FH ●	●		●	
Temperature (humidity) output terminal	Temperature (humidity) recorder	Anti-frost device		
It outputs temperature and relative humidity readings in the test area at DC4-20mA.	Small-size chart recorder with 6-time recording in 100mm. 	This is used for multiple-hour temperature and humidity testing at below +40°C. It allows the chamber to perform multiple-hour, continuous operations without forming frost. 		
FX ●	●	●		
FL ●	●			
FH ●	●			

Rounded cable port		Square cable port	
The inside diameter is 54mm and it comes with stainless steel caps both inside and outside. The port can be created either on the left side or in the ceiling of the main body. The special sealing material is attached to prevent steam from escaping while the current is applied to specimens. *The round cable port with an inside diameter of 120mm is also available with slightly different specifications.		Another type of cable port with a usable opening dimension of 100×30mm. The special sealing material is attached to prevent steam from escaping while the current is applied to specimens. The cap is attached to the hinge to prevent misplacement. The cable port can be created either on the left side or on the ceiling of the main body.	
			
●		●	
●		●	
●		●	
Water purifier		Shelf board, shelf supporter	Heavy-duty shelf board
ETAC's original water purifier that uses ion exchange resin. It supplies pure water at an average electrical conductance of 2μs/cm.		The stainless steel frame shelf board is attached with a mesh fabric. Two shelf supporters for each shelf board. Two shelf boards and four supporters are included as standard equipment. The withstand load is 15kg for all models.	
			
●		●	
●		●	
●		●	
Internal door with glove ports		Automatic restart function for power failure	AC100V plug socket
A pair of glove ports with an inside dimension of 120mm can be created in the internal reinforced glass door so that operators can handle specimens while observing them through the glass door. However, long usage of glove ports may affect the test conditions. *There will be no viewing window on the main door if an internal door is attached. Please note that if the internal door with glove ports is used, temperature ramp-up/ramp-down rates will be different from the standard specification.		This allows the chamber to automatically restart the operation from the condition just before a power failure occurred without an operator pressing the start key. This function is set to activate within 5 minutes.	
			
●		●	
●		●	
●		●	
Ethernet interface		Signal output function when set temperature is reached	Thermocouple
 Complies with the Ethernet standard. By establishing connection with a LAN, it can be used in the network environment.		This function outputs the signal when the test area temperature reaches the set temperature.	
●		●	
●		●	
●		●	
Flashing warning light (patlight)	Humidification water monitoring function	Emergency stop switch	Pressure sensor
Lights up if any error should occur during the operation so that operators will know even from a distance.		It is used when the chamber needs to be stopped immediately.	
●		●	
●		●	
●		●	

Serving High Reliability

ETAC[®]

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ISO9001 Certified
JQA-QM8943



Cautions for Safe Usage

When using our products, please first read "Precautions for Use" in the instruction manual carefully. Do not install in an environment where water, moisture, dust, or oily smoke exist as these may cause fire, breakdown, or electrical shock.